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No. 31, November 2010 | www.cifor.cgiar.org

Forests and climate change in Latin America
Linking adaptation and mitigation in projects and policies

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Key points

- Integrating adaptation and mitigation in forestry projects and policies would maximise local cobenefits and contribute to increased capacity to cope with the risks associated with climate change.
- Latin America has had some preliminary experience with the linkages between adaptation and mitigation at the level of projects.
- Projects should be assessed to determine their potential to include both adaptation and mitigation measures.
- Climate change or forest policies can facilitate the integration of adaptation and mitigation in the forest sector, but few policies in Latin America have addressed the linkages between adaptation and mitigation

Introduction

Scientists and policymakers consider 2 options for addressing climate change: mitigation, which refers to reducing the sources or enhancing the sinks of greenhouse gases (GHGs), and adaptation, which refers to responding to the effects of climate change. Mitigation and adaptation are fundamentally dissimilar approaches and present well-documented differences (Table 1).

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Forests play an important role in both adaptation and mitigation, as they provide local ecosystem services relevant for adaptation as well as the global ecosystem service of carbon sequestration, relevant for mitigation. Consequently, just as there are synergies and trade-offs between global and local ecosystem services, there are synergies and trade-offs between mitigation and adaptation: mitigation projects can facilitate or hinder local people's efforts to adapt to climate change, and adaptation projects can affect ecosystems and their potential to sequester carbon (Locatelli 2010). In Latin America, some mitigation projects have demonstrated positive impacts on social adaptation, and some adaptation projects have resulted in an increase of carbon stocks; however, no project has exploited these synergies fully. Furthermore, few climate change or forest policies in Latin America have addressed the linkages between adaptation and mitigation in the forestry sector.

An understanding of the synergies between adaptation and mitigation could underpin efforts to mainstream these approaches into climate change and forest policies. Many researchers have examined the dilemma of the synergies and trade-offs between adaptation and mitigation, especially at the global level. Some authors believe the two should be pursued simultaneously because they are complementary and may enable 'win-win' policy options (McKibbin and Wilcoxen 2004). However, others express doubts about the feasibility of implementing adaptation strategies in parallel with mitigation (Swart and Raes 2008). With both these strategies being implemented across Latin America, it is necessary to explore the relationships between them, especially potential synergies or trade-offs, and interactions with development plans and institutions in order to maximise their efficiency (Klein *et al.* 2005).

Table 1. Main differences between adaptation and mitigation

	Mitigation	Adaptation
Objectives	Addresses the causes of climate change (accumulation of GHGs in the atmosphere).	Addresses the effects of climate change.
Spatial scale	Primarily an international issue, as mitigation provides global benefits.	Primarily a local issue, as adaptation mostly provides benefits at the local scale.
Time scale	Mitigation has a long-term effect on climate change because of the inertia of the climatic system.	Adaptation can have a short-term effect on the reduction of vulnerability.
Sectors	Some sectors are mostly concerned by mitigation (e.g. energy, transportation and industry).	Some sectors are mostly concerned by adaptation (e.g. water management and health).

Sources: Dang *et al.* 2003, Klein *et al.* 2005, Tol 2005, Ravindranath 2007

Forests and climate change: Projects and policies

Forests and mitigation

With their ability to capture and store carbon, forests contribute to climate change mitigation. Reforestation makes it possible to increase carbon stocks in ecosystems. Reducing deforestation—which represents between 15% and 20% of global GHG emissions—is a way to conserve existing stocks. Afforestation (A) and reforestation (R) projects are eligible under the Clean Development Mechanism (CDM), which is the only international policy instrument promoting mitigation through forests in developing countries. As of October 2010, 6 A/R projects in Latin America had been registered under the CDM (Table 2).

Another initiative, now a focus of the international climate change negotiations, is REDD (Reducing Emissions from Deforestation and forest Degradation). REDD projects are based on the provision of financial incentives to preserve forests and thus maintain carbon stocks in forests. A REDD+ approach has been proposed recently for financing not only forest conservation but also afforestation, reforestation and sustainable forest management (Angelsen *et al.* 2009). Latin American

Table 2. Latin American forestry projects registered as CDM projects by the UNFCCC as of October 2010

Project name	Country	CDM registration date
Carbon sequestration through reforestation in the Bolivian tropics by smallholders of 'The Federación de Comunidades Agropecuarias de Rurrenabaque (FECAR)'	Bolivia	11 June 2009
Reforestation of croplands and grasslands in low income communities of Paraguarí Department	Paraguay	6 Sep 2009
Reforestation, sustainable production and carbon sequestration project in José Ignacio Távara's dry forest, Piura	Peru	16 Nov 2009
Forestry Project for the Basin of the Chinchiná River, an Environmental and Productive Alternative for the City and the Region	Colombia	16 April 2010
Nerquihue Small-Scale CDM Afforestation Project using Mycorrhizal Inoculation in Chile	Chile	27 May 2010
Reforestation as Renewable Source of Wood Supplies for Industrial Use	Brazil	21 July 2010

Source: http://cdm.unfccc.int/Projects/projsearch.html

Table 3. Latin American forestry projects approved by the CCB Standards

Project name	Country	CCB approval date
Native Species Reforestation in Las Lajas, Chiriquí and El Pito, Veraguas	Panama	1 Feb 2007
Return to Forest, Rivas Province	Nicaragua	11 April 2008
The Juma Sustainable Development Reserve Project: Reducing Greenhouse Gas Emissions from Deforestation in the State of Amazonas	Brazil	30 Sep 2008
The Monte Pascoal – Pau Brasil Ecological Corridor, Bahia	Brazil	22 Oct 2009
Avoided Deforestation Through the Payment of Environmental Services in Rainforests Located on Private Lands in the Conservation Area of the Central Volcanic Mountain Range	Costa Rica	28 Oct 2009
Madre de Dios Amazon REDD Project	Peru	2 Dec 2009
Boden Creek Ecological Preserve Project; Toledo	Belize	14 July 2010
Avoided Deforestation in the Coffee Forest	El Salvador	28 July 2010

Source: CCB Projects, http://www.climate-standards.org/projects/index.html

countries are well represented in the REDD debate and many pilot projects are being implemented: the 3 countries with more than 20 REDD+ project initiatives are Brazil (49 projects), Indonesia (46 projects) and Peru (44 projects), according to the REDD database developed by CIFOR (October 2010 version). Several carbon projects have been approved by the Climate, Community and Biodiversity Project Design Standards (CCB Standards) for their expected contribution to biodiversity conservation and local development. Eight of them are in Latin America (Table 3).

Forests and adaptation

The linkages between forests and adaptation are 2-fold: first, forests play a role in adaptation of the broader society ('forests for adaptation'); second, adaptation is needed for forests ('adaptation for forests'). Forest ecosystems contribute to adaptation by providing local ecosystem services that reduce societies' vulnerability to climate change (Vignola *et al.* 2009). It is increasingly being recognised that well-managed ecosystems can help societies to adapt to both current climate hazards and future climate change by providing a wide range of ecosystem services (Turner *et al.* 2009). For example, mangroves protect coastal areas against storms and waves, forest productsprovide safety nets for local communities when agricultural crops fail and hydrological services (such as base flow conservation, storm flow regulation, and erosion control) are of utmost importance for buffering the impacts of climate change on water users (CBD 2009). Ecosystem-based adaptation (EbA) is an emerging approach to adaptation that takes into account the role of ecosystem services in reducing the vulnerability of society to climate change, in a multisectoral and multilevel approach (Colls *et al.* 2009, Vignola *et al.* 2009, World Bank 2009).

In September 2010, the Adaptation Fund of the UNFCCC accepted its first 2 projects. One of these projects ('Addressing Climate Change Risks on Water Resources in Honduras: Increased Systemic Resilience and Reduced Vulnerability of the Urban Poor') aims to improve water management and decrease water problems for the poor in the Honduras capital region of Tegucigalpa. This project extensively considers the role of forests, including how they capture mist from the atmosphere and the negative impacts of deforestation in water catchment areas. The project document states that no mechanisms are currently in place to conserve the forests and the 'green belts' that provide important ecosystem services and that are threatened by deforestation and urbanisation. In addition to this emphasis on 'forests for adaptation', the project also addresses 'adaptation for forests' by aiming

to increase the connectivity between protected areas around Tegucigalpa, in order to increase ecosystem resilience as climate changes. This project is a positive sign of an emerging mainstreaming of forests into adaptation policies, as well as adaptation into forest management.

Linkages between adaptation and mitigation in projects

Forest ecosystems play a role in adaptation and mitigation by providing local services as well as the global service of carbon sequestration. However, ecosystem types or locations with high carbon sequestration may not necessarily secure the provision of other ecosystem services and the best adaptation benefits (Dang *et al.* 2003, Cowie *et al.* 2007). For example, large-scale afforestation and reforestation aiming at carbon sequestration could reduce run-off and water available off-site. Hence, the trade-offs or synergies between carbon and local ecosystem services useful for local adaptation require further investigation, for example by mapping ecosystem services to identify areas where synergies between carbon and local services are clear and areas where trade-offs must be further analysed.

In addition to the synergies and trade-offs between ecosystem services, the linkages between adaptation and mitigation in forestry projects can be observed in terms of livelihoods, local governance and funding. Following are some examples of mitigation projects with potential for adaptation and adaptation projects with potential for mitigation.

Adaptation in mitigation projects

In Latin American countries, the development of mitigation forest projects will most likely affect local communities whose livelihoods depend on forest goods and services. These mitigation activities can thus have positive impacts (e.g. diversified incomes and economic activities, increased infrastructure or social services, strengthened local institutions) or negative impacts (e.g. land or rights deprivation, dependence on external funding) on the sustainable development of the rural poor and thus on their capacity to adapt to climate change.

Some mitigation projects in Latin America have demonstrated positive impacts on livelihoods and, in a few cases, adaptation. The Klinki reforestation programme in Costa Rica aims to install multifunctional plantations with benefits for local stakeholders such as income generation and capacity building, which in turn enhance adaptive capacity (Reyer *et al.* 2009). In Colombia, the forestry project of the Chinchina watershed, registered under the CDM (Table 2), aims at consolidating sustainable forest processes, ensuring hydrological regulation and conserving biodiversity. These actions can be considered as adaptation, although the project documentation does not mention any specific analysis of climate change vulnerability.

Mexico was a pioneer in the design and development of carbon offset projects with the Scolel Té project initiated in Chiapas in 1996. In this project, which is notable for strong local participation, around 60% of the carbon sale price goes to farmers, who use that income to cover the costs of establishing forestry and agroforestry activities and for livelihood needs (food, medicine, house improvement) (Tipper 2002). In the Brazilian state of Amazonas, the Juma Sustainable Development Reserve Project implemented by Amazonas Sustainable Foundation (FAS) was the first REDD+ initiative to be validated in Latin America by the CCB Standards (Viana 2010). Although the project was developed as a mitigation project, many aspects of its project design and benefit sharing address both mitigation and adaptation concerns. The project created a new mechanism building on earlier federal experience using social stipends (*bolsa*) to pay for environmental services based on a commitment to reducing deforestation in primary forests.

In addition to incorporating issues of social adaptation, mitigation projects should also strive to reduce the impacts of climate change on ecosystems, as such impacts may jeopardise the mitigation potential of the projects. An example is the incorporation of fire protection measures and forest management practices such as sanitation harvest or increased thinning to reduce the risk of pests and diseases (Guariguata *et al.* 2008). It is important that all these measures be mainstreamed into mitigation projects to ensure the permanence of carbon sequestration. However, it seems that very

few mitigation projects incorporate measures for adapting forests to climate change (Reyer *et al.* 2009). An exception is the Klinki project in Costa Rica, where climate-related risks were identified (fire, storms, diseases and pest outbreaks) and specific measures were adopted (e.g. test of different mixtures of native and non-native species and adequate thinning for reducing vulnerability to storm and fire). Similarly, no approved methodologies for CDM A/R projects address issues of forest adaptation (Reyer *et al.* 2009).

Mitigation in adaptation projects

Ecosystem-based adaptation projects can directly benefit climate change mitigation, through either increasing or maintaining carbon stocks. This is the case of the adaptation project in Honduras accepted by the UNFCCC Adaptation Fund and described above ('Addressing Climate Change Risks on Water Resources in Honduras'), even though the project's contribution to mitigation is not explicit in the project document. Adaptation projects can also have negative impacts on mitigation. For instance, infrastructure-based adaptation projects in coastal areas (such as dikes and dams) can adversely affect coastal ecosystems and reduce their capacity to store carbon. Integrating explicit mitigation objectives into an adaptation project can help in overcoming financial barriers to adaptation, as these projects can benefit from mitigation funding (CDM, REDD+, voluntary carbon markets). Funding appears to be the most appealing reason for including mitigation in adaptation projects.

In Colombia, the Integrated National Adaptation Plan (INAP) aims at addressing the impacts of climate change across the country with public policy interventions and the implementation of EbA measures (Colls *et al.* 2009). Pilot projects are being implemented in the most vulnerable ecosystems of the country (for example, mountain forests and grasslands or shrublands located at high elevations). For mountain forests, the flagship project is located in the Chinganza Mountains, which provide water to Bogota, the capital city. The project includes ecological adaptation measures (such as ecological restoration and fire management), as well as activities related to mitigation (such as carbon monitoring), even though this project does not benefit from mitigation funding. Another Colombian initiative is the Joint Program for Integration of Ecosystems and Adaptation to Climate Change in the Colombian Mountains. This programme combines mitigation and adaptation activities in the landscape by protecting ecosystem services in the upper watershed of the Cauca River in order to address climate change and achieve the Millennium Development Goals.

Synergies of mitigation and adaptation in land use based strategies have also been explored in public–private partnerships in Latin America. This is the case of the GTZ Project AdapCC in north Peru, which has collaborated with an association of coffee producers (CEPICAFE) to identify adaptation strategies and analyse funding opportunities for their contribution to mitigation. CEPICAFE signed an agreement with Cafédirect, a fair-trade organisation, regarding the sale of carbon credits under the carbon voluntary market.

Linkages between adaptation and mitigation in national policies

National policies in Latin America rarely link mitigation and adaptation, although in theory, national mitigation policies can benefit adaptation and vice versa. In many countries in the region, the focus remains on developing mitigation plans, although recently, tentative steps have been taken to address adaptation also. As only least-developed countries are required to produce a National Adaptation Programme of Action (NAPA) under the UNFCCC, the NAPA process concerns only one country in Latin America and the Caribbean: Haiti.

In Mexico, the National Commission for Protected Natural Areas has defined a climate change strategy with clear synergies between adaptation and mitigation. That strategy aims to increase the adaptive capacity of ecosystems and people and to contribute to GHG mitigation. In Colombia, the national authorities assess CDM projects according to their contribution to sustainable development, but the criteria do not include aspects associated with adaptation. However, the government recognises that including adaptation in the approval process of these types of projects is a fundamental step in the development of the national climate change policy. Colombia does not have a

national approval procedure concerning REDD+, but the government has expressed interest in including biodiversity conservation and adaptation to climate change as selection criteria.

National policies regarding land tenure and rights, which are not directly related to climate change, also influence mitigation and adaptation strategies. Insecure property rights are an indirect cause of deforestation and can increase social vulnerability. In Mexico, reforms following the Revolution resulted in the creation of agrarian communities and *ejidos*, leading in many areas to the clearance of forest areas for agriculture. However, the reforms also permitted the establishment of structures for community-based natural resource management, which have proved effective in protecting many forest areas from external and internal pressures. In this context, communities in Mexico are a powerful force for both mitigation and adaptation activities (Bray 2010).

Linkages between adaptation and mitigation at the international level

The architecture of international agreements (i.e. setting emission targets under the Kyoto Protocol) reflects how mitigation activities (GHG emission reductions or sink enhancement) have been the primary focus of international climate policies. However, as recognition of the need to include strategies to increase the adaptive capacity of ecosystems and societies has grown, so has international attention to adaptation and its linkages with mitigation. Adaptation and mitigation were 2 major components of the roadmap for negotiations between COP 13 (Bali, 2007) and COP 15 (Copenhagen, 2009), and were highlighted in proposals to the UNFCCC's Ad Hoc Working Group on Long Term Cooperative Action (AWG-LCA) prior to Copenhagen. In particular, the position paper by Guatemala, the Dominican Republic, Honduras, Panama and Nicaragua stated that 'adaptation measures should be developed considering (…) the synergies between adaptation and mitigation, and within which REDD options are particularly relevant'.

The CDM is the only mechanism under the UNFCCC that explicitly links mitigation and adaptation. CDM projects generate carbon offsets called Certified Emission Reductions (CERs), which are tradable in the carbon market. A levy of 2% of CERs issued is imposed to finance the Adaptation Fund (Kyoto Protocol Article 12.8). Once operational, the fund will finance projects that support adaptation to climate change in developing countries. As a result, the more effective mitigation is (i.e. the CDM), the greater the amount of funds to be expected for adaptation.

In terms of international voluntary standards for mitigation projects, only the CCB Standards require project developers to consider climate change adaptation in the project planning. The CCB Standards for national/subnational REDD+ include adaptation in their 'sustainable development' criteria and in their 'biodiversity and ecosystem services' criteria. Some REDD projects in Latin America have already applied them, for example in Peru.

Conclusions

To date, adaptation and mitigation have been treated as 2 distinct approaches to climate change, with global negotiations and national policies focusing more on mitigation than adaptation. Adaptation and mitigation measures have the potential to be mainstreamed into forestry activities in Latin America. Such mainstreaming can occur at the project level through the inclusion of adaptation requirements in the CDM A/R or in REDD+ or by facilitating the access of EbA projects to mitigation funding. Integrating adaptation and mitigation in forestry projects would maximise local co-benefits and contribute to increased capacity to cope with the risks associated with climate change. The development of synergies is desirable at the international level because it is possible to connect climate change mitigation and adaptation to other multilateral environmental agreements related to forests, biodiversity and desertification (Klein *et al.* 2005).

However, there are risks involved in focusing too intensely on creating synergies. In view of the different actors involved in mitigation and adaptation, the implementation of synergetic measures may encounter greater institutional complexity, both nationally and internationally (Klein *et al.* 2005, Kok and de Coninck 2007). Some activities may have to be related only to either adaptation or mitigation, as synergies cannot be identified everywhere for achieving the levels of mitigation and adaptation required.

Most of the scientific literature on the links between adaptation and mitigation provides theoretical analysis on the possible synergies and trade-offs between adaptation and mitigation at the global level. However, for the forestry sector, empirical studies are lacking and more research is needed to explore the linkages between adaptation and mitigation in forests, at the levels of landscapes, projects, countries and international agreements. Latin America has some preliminary experience with the linkages between adaptation and mitigation at the local level, but this needs to be engendered through supportive policy frameworks.

Note

This summary was drawn from the paper 'Forests and climate change in Latin America: Linking adaptation and mitigation' by Bruno Locatelli, Vanessa Evans, Andrew Wardell, Angela Andrade and Raffaele Vignola, prepared for the Workshop on Forest Governance, Decentralisation and REDD+ in Latin America: Emerging Issues, held in Oaxaca, Mexico, 31 August – 3 September. The full paper will be published in a special issue of Forests, an open access journal of forestry and forest ecology: http://www.mdpi.com/journal/forests.

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This summary was drawn from the following paper "Linkages between climate change adaptation and mitigation in Latin American forests", prepared for the 'Workshop on forest governance, decentralisation and REDD+ in Latin America and the Caribbean', Oaxaca, Mexico, 31 August – 3 September 2010. The workshop was a country-led initiative in support of the United Nations Forum on Forests (UNFF) (http://www.cifor.cgiar.org/Events/Oaxacalist/introduction.htm). The full paper will be published in a special issue of Forests, an open access journal of forestry and forest ecology: http://www.mdpi.com/journal/forests.

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